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ABSTRACT

Fundamental problems in the collection and use of data, in particular the need to develop and use criteria for data, are discussed. Specific examples of the use and misuse of data related to teachers and children in the public schools are presented. Two methods of data collection--manifest techniques and formal response instruments--are evaluated in terms of advantages and disadvantages, as well as reliability and validity. Additional consideration is given to criteria for pre-collection data phases, and test selection (ability and achievement tests). (AE)

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THE GATHERING AND USE OF DATA

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(This talk was given before a group of Brazilian educational leaders on October 26, 1970 at a seminar held by the Department of International and Development Education of the University of Pittsburgh.)

We take our text from a 1967 Report of the United States Commission on Civil Rights, in which the following testimony is given by an Associate Superintendent of Schools of one of our largest cities:

> ...here was a teacher who had copied the IQ numbers down the line from a list in the principal's office...Throughout the semester if the teacher called on Mary, let us say, with an IQ of 119, she followed somewhat this pattern: If Mary didn't respond quickly, "Well, now, come on, Mary. You know you can do this. You know how we did this yesterday," or bring up an analogous situation. She encouraged, she stimulated, until Mary came up with the proper answer, or what the teacher at least considered an adequate one. However, when she called on poor John with his 74 IQ, if he mumbled something fairly audible, why, this was wonderful; pat him on the back and, "Be sure and be here tomorrow. You can wash the windows and help move the piano and water the flowers, and the erasers must be washed," and so forth. This is the kind of encouragement that he got with a 74. This is teaching by IQ. She was a little horrified at the end of the semester when she turned in her grades. She looked under the glass and saw that the columns she had copied for IQ's were locker numbers. Now, this is about what goes on.

There are many reasons why one may wish to collect data about an educational system, or any system for that matter. The cause may be a dissertation, a need to lend support to a political decision, a need to defend and preserve an institution, and so forth.

Also, one may wish to collect data for research, experimentally designed to discover new knowledge about curricular or methodological alternatives. Or one may simply want to describe the system, and descriptive data are gathered.

A neglected but important reason to gather data, particularly for national and regional educational planners, is to develop viable alternatives for decision-makers. In the term "decision-makers" we include you and those above you in the substantive as well as resource-allocation lines of authority.

The question is what data. In our view, the collections of data are economic activities in the sense that we are dealing with scarce resources--time, energy, material, machinery and good will --necessary to make and carry out decisions about what data, when, in what quantity and from whom they will be gathered ; in order to collect, process, analyze, and report the data and in order to obtain good raw material from the source.

It is therefore important that we develop and use criteria for data not only because of the scarce resources which necessarily go into their collection and use, but also because they have to serve our purpose and needs once collected.

Let us consider some specific examples with regard to children and teachers in the public schools.

The system typically collects a good deal of data on children in school, but we suspect that the most widely available and quoted data are derived from standardized tests, such as achievement tests and so called "ability tests." One often finds it difficult to publicly explain or defend the use to which such test results are put. Research so far has not supported their use as devices for placing students on tracks or in streams. They are not widely used for diagnostic purposes nor in other ways that would help the child do better in school. They are seldom used for any respectable educational research except in the case of specially designed studies like the Coleman study in Equal Educational Opportunity (1966, Washington, D.C., U.S. Government Printing Office).

Of course, there is variance among tests, and some exceptions to the above can always be cited, but in general these criticisms are not unfair. It is important to note, however, that the criticisms are directed not at the tests but at the use, lack of use, or misuse of the tests. Thus, if standardized achievement tests have some predictive capacity with regard to later school achievement, what positive action do we base on such data? In the negative sense, of course, one can always cite examples of the use of test data to create or reinforce impressions of ability or dullness which may not be valid.

A thought bordering on heresy: what calamities would result in schools if we did away with standardized achievement and ability tests?

Now let's go to the subject of teachers. The teaching staff is a manipuable variable; unlike students, home and family environment, deep-seated attitudes, and heredity, which seem to us rather important but rather fixed variables in student success at learning, the teaching staff (as well as other variables like facilities, curriculum, methods) is not fixed. It is always in the process of changing and, we hope, growing. Yet we collect little useful data on teachers, or at least we collect the wrong data, and in any case don't intelligently use the data we collect.

For example, Coleman data show that teacher verbal skill, not level of education nor teacher experience, is most strongly related to achievement of children in school, at least in regard to the traditional indices of school quality. Yet our data on teacher experience and education are much more carefully collected and more widely used in determining who gets hired, placed and rewarded.

It may be that if we were more rational, we would begin to collect data on the characteristics of successful teachers, then try to replicate these characteristics in the selection and training of teachers.

We may find that some teachers are right for some children and wrong for others. One study* suggests that "since different students will respond differently to different styles, attitudes, activities, language, strictness, etc. these properties of teacher activities should be investigated." Clearly, if "teacher specificity" is important to pupil achievement, the data collected on teachers will have to be greatly changed and augmented.

To avoid belaboring a point, it is time to tie some thoughts together. First, we have to be honest with ourselves in selecting data to be obtained. If our educational objective is the preparation of good men and women --however we define good --we honestly can't tell how well we do that by gathering achievement test data. That must be a very small aspect of the life of the good man.

Second, we have to carefully analyze and dissect our goals so that we can develop criteria for research and related data collection. It doesn't make much sense to gather data on the height of each child if the goal of the school is unrelated to height.

Third, having made decisions about, for example, curricular methodological and teaching strategies, it will be necessary to gather only the specific data that will indicate progress or lack of progress.

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* Stephen Michelson, "The Association of Teacher Resources With Children's Characteristics" in Do Teachers Make a Difference, U.S. Government Printing Office, Washington, D.C., 1970

The more performance-oriented the data is, the better; but the inability to gather performance data, or indeed any relevant data at all, does not ipso facto mean that the strategy or goal is poor. It means rather that we do not have the tools to measure it; and that admission might be made much more often by those whose business is the collection of data.

Now, having discussed the use and collection of data at a high level of abstraction, let us admit that we have to face data problems today and deal with them as intelligently and sensitively as we can. For that reason we have put together a necessarily brief discussion for you which is more practically oriented.

A great many data are routinely available to the school administrator. Attendance records, grade averages, intelligence scores, drop-out rates, to mention a few examples, are collected on a routine basis by almost all school systems. Often little thought is given to what use is to be made of this information and, as a result, it is usually collected, stored and forgotten. On the rare occasion when these data are examined for possible information, it is usually discovered that either the wrong data have been collected or are incomplete. It is of prime importance that due consideration be given to what questions the data are expected to answer before any collection is initiated.

Once it is decided that the collection of data is necessary to help solve some problem, a decision has to be made as to how the data are to be collected. For the purposes of this paper we will discuss two methods for collecting information: response instruments and manifest techniques.

Manifest Techniques. No matter what name is given to a formal response technique, and regardless of whether it is measuring academic achievement or attitude towards school, all such paper and pencils tests are basically cognitive. As an alternative to the collection of information by the use of formal response instruments, consideration should be given to the use of manifest techniques. What we mean by a manifest technique is best shown by an example. In a school project it is decided that it is important to measure the degree of interest that parents show towards the operation of the school. As a result of this decision, an attitude scale is drawn up and administered to a random sample of parents. Thus we have a formal response instrument being used to gather data. It is then reasoned that if any change does take place in the attitude of parents towards the school this change will be reflected in their attendance at PTA meeting. A count is then made at each scheduled PTA meeting and a record kept. In this situation parents expressed their attitude toward the school through the manifestation of their involvement in school activities.

One of the principal advantages that this data collecting technique has over the use of formal response instruments is that it can be non-reactive. Often when formal response instruments are administered the change that takes place in the subject is due as much

to the test instruments as to the treatment. When a manifest technique is used the subjects are often unaware that any data are being collected and do not alter their behavior because of a testing situation.

This brief mention of the use of manifest data in this paper has been made to alert the reader of its existence. For a more in-depth treatment of the subject, the reader is referred to the excellent text by Webb et al. titled, Unobtrusive Measures: Nonreactive Research in the Social Sciences.

Response Instruments. By response instruments we mean those situations where the respondent makes a formal reply to specific questions or statements. Examples of instruments used in this method are standardized tests, teacher-made tests, attitude scales, interview schedules and questionnaires. Of these, the standardized test is one of the most important instruments. In selecting a standardized test, consideration should be given to the validity and reliability of the instrument. Also, a careful investigation of the existing norms should be made before a final selection takes place.

Validity is concerned with the question, "Does the test measure what it is supposed to measure?"; reliability asks, "Does the test produce a consistent, accurate result?"; finally, usability, which refers to the question, "Can the test be used with a minimum expenditure of time, energy and money?" Beyong these three criteria, the following are some methods of selecting the best test for evaluation purposes.

POINTS TO CONSIDER BEFORE COLLECTING DATA

1. Why is the instrument being given? For example, why are standardized tests given in school systems? David A. Goslin in Teachers and Testing, 1967, summarizes the reasons given by public secondary school administrators for the use of standardized tests in schools (see Appendix I).

2. What will be done with the results? A question such as, "What use will be made of the result from this test by students, teachers or administrators?" has to be answered before an appropriate instrument can be selected. David A. Goslin, in Teachers and Testing, 1967, summarizes the general purposes of standardized tests given by public secondary school administrators. (see Appendix II).

3. Has the information already been collected by some other agency? If it has, why duplicate the effort? A little research effort by school administrators will often save them a great deal of time, energy and money.

This list is not intended to be definitive, but is given as an example of the types of questions an administrator or teacher should ask himself before deciding to initiate some testing program.

1. Reputation - It is simple to ask others about a test which they have used and what their feelings are about its effectiveness.

2. Mental Measurements Yearbook - This book may be used in two ways: The yearbook acquaints teachers with the tests available in the various fields of instruction and guidance and reading the reviews of each test helps to reduce the number of tests to be considered.

3. Manual of the Test - Almost all tests are accompanied with a manual that describes the test, how it was standardized, and reports the validity and reliability of test. The manual also gives directions for administering and scoring the test.

4. Obtain a Sample Set - This is the culminating step in the selection of a test. This permits the instructor to take the test himself and relate it to his purposes and pupils.

The following lists summarizing the uses of standardized tests and the tables in the appendix are commonly used to illustrate the use of tests. We think it would be a very useful and instructive exercise for you, individually or in small groups, to go through the lists and item by item, picking out the following:

Which of these uses are commonly found in the schools? (How are tests actually used in the schools?)

Which of these uses are educationally sound?

Which of these uses are practicable for the teacher?

An Ability Test is used:

1. To determine the level at which the pupil is capable of learning. (The mental age of the child reported in years and month is a good index of the level in the curriculum at which the child will be most capable of working.)

2. To determine the rate at which the pupil learns. (The intelligence quotient is an index of the rate of learning.)

3. To determine the position of a pupil in relation to others.

4. To assist in general ability grouping.

5. To determine the structure and pattern of ability for educational and vocational guidance.

6. To determine whether ability is a factor in a learning or behavior problem.

7. To aid the teacher in setting reasonable standard of attainment.

8. To provide information for better instruction in the areas of methods and materials.

An Achievement Test is used:

1. To determine the current achievement status of the individual student.

2. To evaluate the achievement of the pupil in relation to his actual grade placement and intellectual grade placement.

3. To determine the strong and weak areas of individual and group achievement.

4. To analyze the causes of individual and group difficulties and then to plan remedial action.

5. To help the teacher evaluate his own instruction.

Table 5: Reports of public secondary school administrators of the importance of various reasons for the use of standardized tests in their school (Percentages)

REASONS FOR TESTING	DEGREE OF IMPORTANCE: OF NO IMPORTANCE	OF VERY LITTLE IMPORTANCE	FAIRLY IMPORTANT	VERY IMPORTANT	NUMBER OF SCHOOLS RESPONDING
To meet state testing requirements	54.1	17.6	13.5	14.9	(74)
To section pupils in any course by achievement level	21.3	32.0	38.7	8.0	(75)
To section pupils in any grade by level of mental ability	29.3	30.7	33.3	6.7	(75)
To help in guiding pupils into appropriate curricula	1.3	6.7	45.3	46.7	(75)
To select applicants for admission to your school	87.8	9.5	1.4	1.4	(74)
To compare the average scores of pupils with those of other schools	26.7	36.0	34.7	2.7	(75)
To measure the level of achievement of individuals at the end of the school year	14.9	13.5	44.6	27.0	(74)
To measure the gain in achievement made by individuals during a school year	12.2	14.9	43.2	29.7	(74)
To measure the average gain in achievement by all pupils in a given course during the school year	12.2	35.1	31.1	21.6	(74)
To help pupils gain a better understanding of their strengths and weaknesses	1.4	1.4	25.7	71.6	(74)
To help in educational and vocational counseling of pupils	1.3	.0	29.3	69.3	(75)
To help in counseling parents	1.3	12.0	40.0	46.7	(75)
To evaluate the school curriculum	2.7	18.7	49.3	29.3	(75)
To evaluate teacher effectiveness	25.3	33.3	29.3	12.0	(75)

Table 6: Reports of public secondary school administrators of the frequency with which standardized test scores are used for various purposes in their school (Percentages)

PURPOSES OF TESTING	FREQUENCY OF USE FOR THIS PURPOSE: NEVER	OCCASIONALLY	FREQUENTLY	VERY OFTEN	NUMBER OF SCHOOLS RESPONDING
To diagnose reasons for failure to learn on the part of pupils	5.3	25.3	41.3	28.0	(75)
To assess pupils' achievement	5.3	22.7	41.3	30.7	(75)
To provide a basis for school marks	62.7	30.7	5.3	1.3	(75)
To assess the potential learning ability of pupils	1.3	16.0	45.3	37.3	(75)
To provide a basis for individualizing instruction	9.3	48.0	32.0	10.7	(75)
To identify under- or over-achievers	1.3	24.0	44.0	30.7	(75)
To guide pupils in their choices of specific high school subjects	6.7	18.7	34.7	40.0	(75)
To guide pupils in their choices of curricula	2.7	20.0	38.7	38.7	(75)
To guide pupils in their decisions about post-high school education	.0	18.7	34.7	46.7	(75)
To guide pupils in their choices of specific colleges	10.7	36.0	24.0	29.3	(75)
To guide pupils in their choices of occupations	5.3	28.0	42.7	24.0	(75)
To inform institutions of higher learning about their applicants for admissions	5.3	20.0	29.3	45.3	(75)
To inform prospective employers about job applicants	8.0	52.0	22.7	17.3	(75)
To inform pupils about their own abilities and achievements	6.7	16.0	32.0	45.3	(75)
To inform teachers about the abilities and achievements of their pupils	1.3	21.3	41.3	36.0	(75)

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